Manhattan Project National Historical Park
Hanford, Washington

National Park Service
U.S. Department of the Interior

MANHATTAN PROJECT NATIONAL HISTORICAL PARK
HANFORD UNIT
B REACTOR NATIONAL HISTORIC LANDMARK

JUNIOR RANGER BOOK

This book belongs to:

_____

The Manhattan Project National Historical Park is a partnership between the National Park Service and the Department of Energy that tells the stories of top-secret sites in Los Alamos, NM; Hanford, WA; and Oak Ridge, TN that were created as part of the Manhattan Project during World War II. Aimed at developing an atomic weapon before Nazi Germany, the Manhattan Project successfully produced two of the most powerful weapons the world had ever seen, helping bring an end to the war and ushering in the Atomic Age.

Junior Ranger Program

National Parks are very special places that protect the most important stories in our nation's history and allow all visitors to experience our heritage. This handbook will help you discover why the Manhattan Project National Historical Park is one of these special places. Allow about 3 hours to earn a Junior Ranger badge.

Activities in this Junior Ranger book can be completed by taking a tour of the B Reactor National Historic Landmark.

Some other historic spots in our area are:

- The pre-World War II Park sites at Hanford (White Bluffs Bank, Bruggeman's Warehouse, Hanford High School, and the Allard Pump House)
- "Alphabet" homes built for workers
- The USS Triton Sail Park
- Sacajawea State Park
- Whitman Mission National Historic Site

Remains of the old Hanford High School.

Questions?
Call the Park's Visitor Contact Station and Tour Headquarters for the Hanford Unit at (509) 376-1647.

Manhattan Project – Hanford Visitor Contact Station and Tour Headquarters
2000 Logston Boulevard
Richland, Washington 99354

Visit us online!

www.nps.gov/mapr
manhattanprojectbreactor.hanford.gov/

Twitter@MnhtnProjectNPS

www.facebook.com/ManhattanProjectNPS

What is a Junior Ranger?

Someone like you who completes Junior Ranger activities and promises to care for our National Parks. Have fun exploring! You can earn your badge during your tour of the B Reactor National Historic Landmark. When you are done, take this handbook to the Visitor Contact Station and show it to one of the staff.

To earn a badge, complete at least 8 handbook activity pages.

1st Activity Page

Designed in 1951, the arrowhead is the National Park Service symbol. Look at it carefully. Each part represents something that park rangers protect. Fill in these words to decode the Arrowhead.

bison sequoia tree lake arrowhead mountain

The _____represents plants.

The _____represents animals.

The _____ represents scenic landscapes.

The _____ represents water resources and recreation.

The _____ represents history and culture.

Did You Know?

In 1872, Yellowstone National Park became our country's first national park. In the early years, most national parks were in the western states. That's why the badge has western symbols. Today, the National Park System includes seashores, battlefields, monuments (like the Statue of Liberty), huge wetlands, scenic rivers, islands, and parks focused on history (like Manhattan Project National Historical Park). Record how many arrowheads you see during your visit. Can you spot them on signs, cars, brochures, and uniforms?

List any other national parks you have visited.

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

3rd Activity Page

Manhattan Project National Historical Park
Kids in Action Challenge:

There are many fun ways to get moving in this national park. Our challenge to you is to do one activity for each year of your age. For example, if you are 8 years old, we'd like you to **complete 8 things on our list**. Check the square when you finish each one.

- ☐ I had my picture taken in the operator's chair in the Control Room.
- ☐ I saw the office where Enrico Fermi worked while at Hanford.
- ☐ I saw a picture of a Flying Fortress bomber named "A Day's Pay."
- ☐ I looked down into the Valve Pit.
- ☐ I saw a train engine with the number "3731."
- ☐ I listened at the "Hear-Here" booth.
- ☐ I saw a steam operated exhaust fan.
- ☐ I found three or more clocks all stopped at 10:48.
- ☐ I saw graphite blocks with holes in them.
- ☐ I saw a white Charging Elevator.
- ☐ I saw my first _____.
- ☐ I saw three hydraulic accumulators.
- ☐ I discovered who Leona Woods Marshall Libby was.
- ☐ I saw a picture of one of the mess halls at the Hanford Construction Camp.
- ☐ I know why there is a Plexiglas box around the Ball 3X switch in the Control Room.

Your Hanford IQ

What was the code name for the Hanford site during World War II? _____

Who was president in 1941? _____

Which president authorized the dropping of an atomic bomb on Japan to help bring an end to World War II?

_____

What was the purpose of the Manhattan Project? _____

_____

In which town would you find the Alphabet Houses?

_____

Circle the **three** towns, from the list below, that were evacuated when the government arrived in 1943.

Yakima White Bluffs Wenatchee Pasco Richland Prosser Hanford

What was the name of the construction camp? _____

What was the code name for uranium? _____

What was the code name for plutonium? _____

What was the name of the mountain that formed the western boundary of the Hanford site? _____

5th Activity Page

Who was the official Manhattan Project Photographer at Hanford?

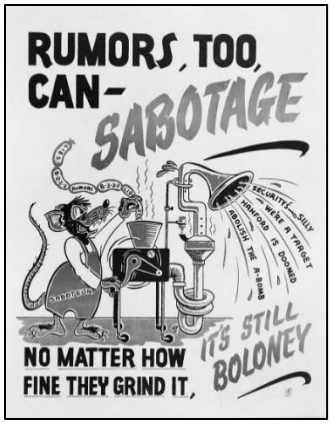
_____

Who was the army general that led the Manhattan Project in 1942?

_____

What are the names of the other two top secret locations that are now part of the Manhattan Project National Historical Park? What went on at each during World War II?

1. _____
2. _____



What was produced at Hanford? What was this product used for? _____

_____

List at least three different types of housing workers lived in at the Hanford Construction Camp:

_____

_____

_____

6th Activity Page

How many process tubes did the graphite core in the B Reactor hold? _____

How long did it take the cooling water to pass through the process tubes before exiting the rear of the reactor? _____

When the B Reactor first came online in 1944, it operated at 250 mega (million) watts and required: 10,000 / 35,000 / 75,000 gallons of water per minute (circle the correct answer)

When the B Reactor shut down in 1968, it operated at more than 2000 MW and required:

10,000 / 35,000 / 75,000 gallons of water per minute (circle the correct answer)

How many vertical safety rods were used in the reactor? _____

How many horizontal control rods were used? _____

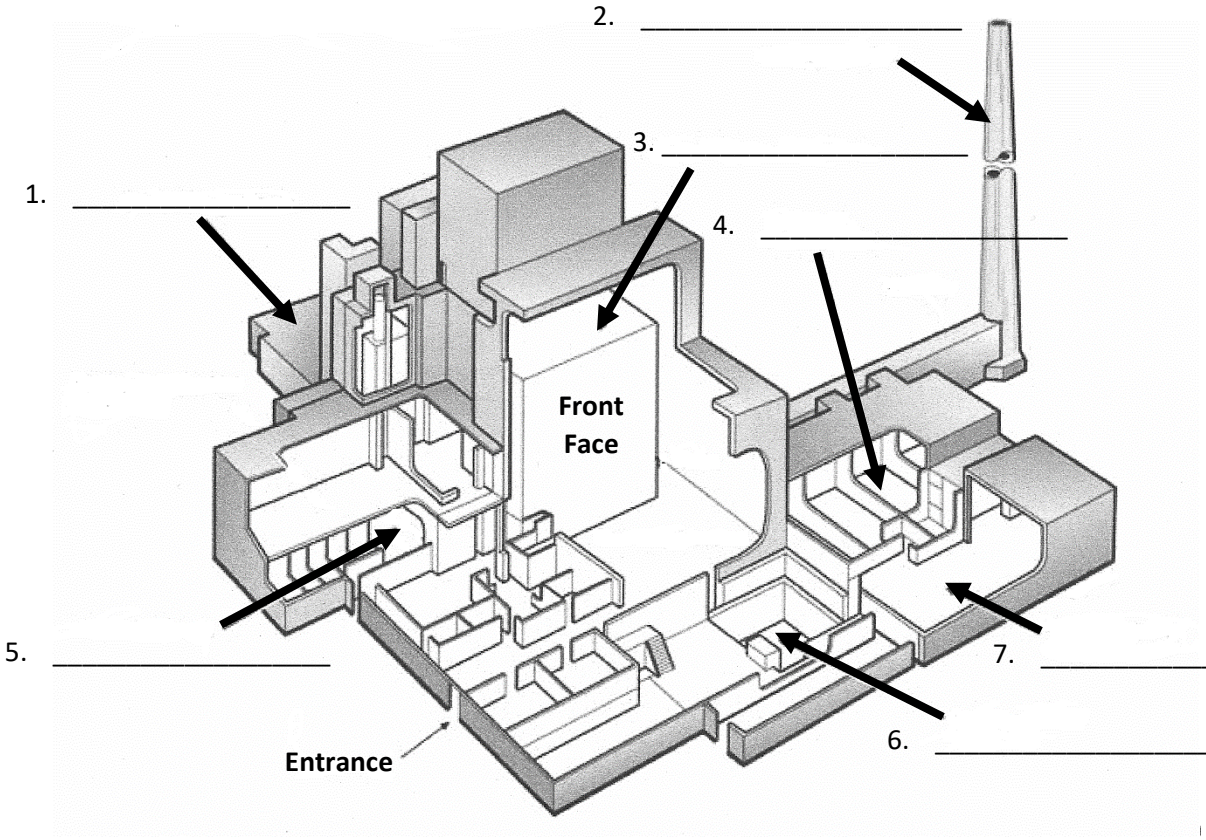
Below is a picture of one of the chemical separation facilities in the 200 Area where irradiated fuel was processed. What was the nickname the workers gave these buildings?

_____

T Plant 1944

7th Activity Page

Using the terms listed beneath the diagram, see if you can identify the locations marked below. The following page has a description of each location to help you.



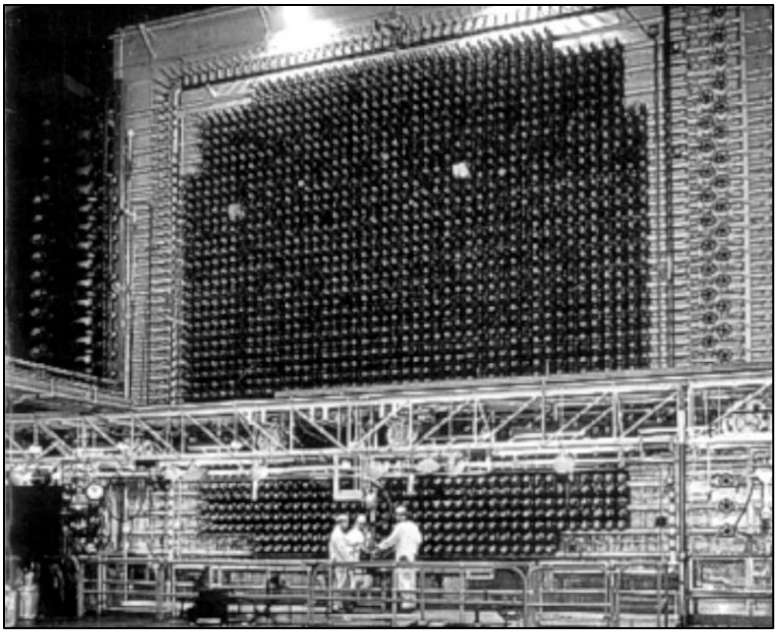
Possible terms (not all are used):

Intake Fan Room	Exhaust Fan Room	Bathroom
Lunch Room	Fuel Storage Basin	Accumulator Room
Valve Pit	Chemical Lab	Exhaust Stack
Control Room	Nurse's Station	Graphite Core

7th Activity Page (continued)

Location Descriptions

1. This was where the discharged irradiated fuel would be found.
2. Air that has left the building exits via this structure.
3. The core of the reactor is made of this material.
4. Equipment located here ensures that air in the building is removed after circulating throughout the building.
5. Operators monitor and regulate the reactor from this room.
6. Lots of pipes brought cooling water into the building through this room.
7. Equipment located here brought in fresh air to the reactor.



8th Activity Page

Match the person with their description.

____ John Archibald Wheeler	a. West Point graduate and Director of the entire Manhattan Project.
_____ Leona Marshall Libby	b. "Officer-in-charge" at Hanford; his bust can be found in the entryway of the B Reactor.
_____ General Leslie R Groves	c. Italian émigré who was the first to demonstrate a controlled self-sustained nuclear chain reaction.
_____ Franklin Delano Roosevelt	d. PhD physicist who worked closely with Fermi and had a personal bathroom in the B Reactor.
_____ Colonel Franklin Matthias	e. American physicist who made significant contributions to the B Reactor design and predicted the possibility of a "Mysterious Failure".
_____ Enrico Fermi	f. President who authorized the establishment of the Manhattan Project, but who died before a bomb was ever dropped.

Manhattan Project NHP Hidden Word Search

Can you find the words that are important to the Manhattan Project and the Hanford unit of the Park?

B D O S I M E T E R R E A G C
T O R O M U I N O T U L P R V
Y Z B M U I N A R U B L N A U
V R J U W I S N R D M Y O P E
V S O N E U T R O N A U R H O
C O N T R O L R O D R J T I L
N E V I A Z H F E O C H C T I
T O E P K R S R L P S N E E A
A A P J P G E I X E O V L J T
F I S S I O N D M R C T E Q G
E B U T S S E C O R P T O R I
N J A E H Q B B Y M E U V S P
X F G P Q Y X M L X I F R O I

Boron
Control rod
Dosimeter
Electron
Fermi
Fission
Graphite
Isotope
Moderator
Neutron
Pigtail
Plutonium
Scram
Uranium
Process tube

10th Activity Page

Word Jumble

The answers to the questions below are jumbled. Can you straighten them out?

Where did the first controlled nuclear chain reaction occur?

HIGOACC ___ ___ ___ ___ ___ ___ ___
9 3

What was the name of the scientist that accomplished this feat?

RINOCE MRFIE ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
8

What was the name of the top secret program to develop the atomic bomb?

HATANANMT JORCEPT ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
12 2 6

Who was put in charge of this program?

SLIELE VEORGS ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
5 11

Where was the first full scale nuclear reactor built?

FORNDAH, HASGINWOTN ___ ___ ___ ___ ___ ___ ___ , ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
1 7

What material was produced at Hanford?

TOULPINUM ___ ___ ___ ___ ___ ___ ___ ___ ___
10 4

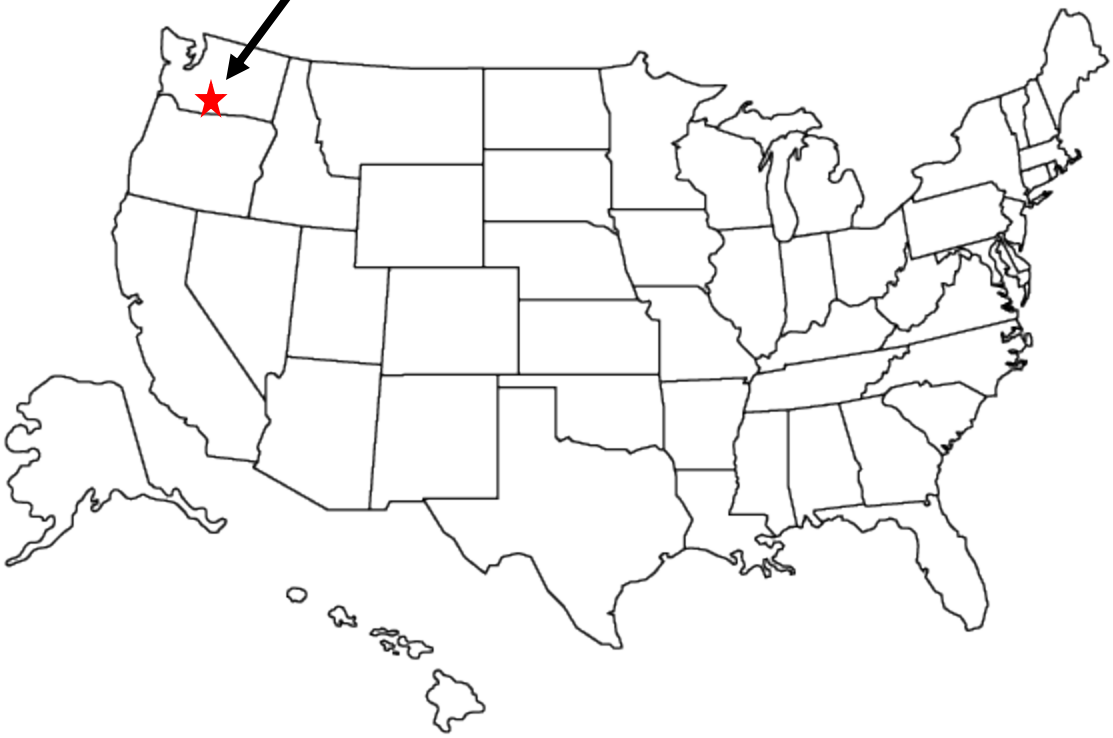
Can you find the secret word? Take the letter with a number under it and place it in the space with the same number below:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
1 2 3 4 5 6 7 8 9 10 11 12

11th Activity Page

Map Trivia

Manhattan Project National Historical Park
Hanford, WA



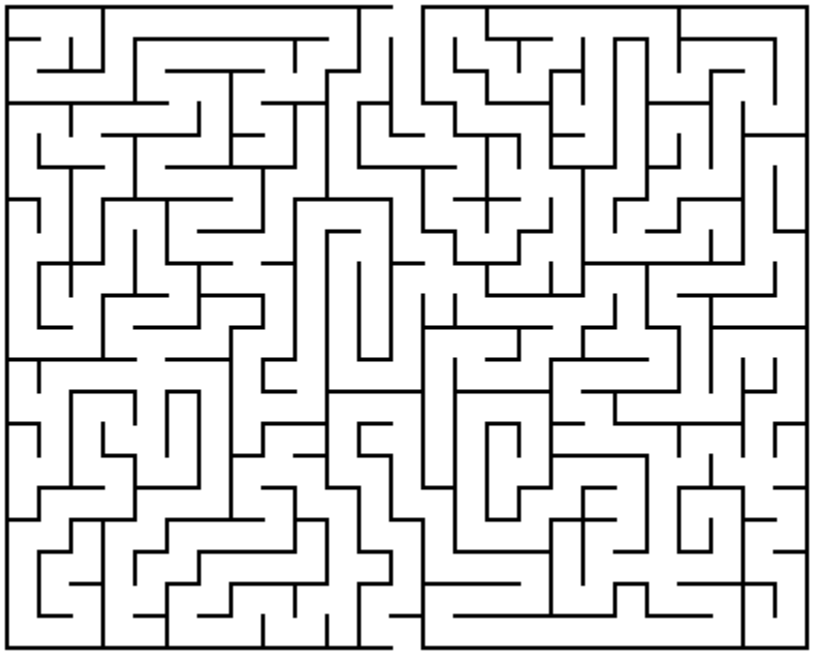
1. Circle your own state.
2. Trace your trip from your home to the Manhattan Project National Historical Park at Hanford.
3. Put a star where Los Alamos, NM and Oak Ridge, TN are located.
4. Name the National Park that is closest to your home:
   _____

12th Activity Page

Amazing! See if you can find your way from Tour Headquarters to the B Reactor.

Tour Headquarters

START

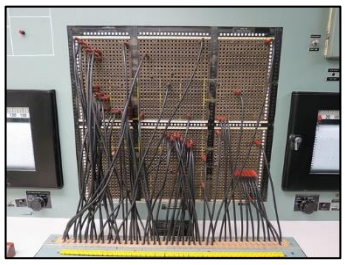


END

B Reactor

13th Activity Page

I Saw That! Draw a line through each item as you see it. How many: _____



Junior Ranger Pledge

As a Junior Ranger of Manhattan Project National Historical Park, I promise to keep learning more about the history and legacy of the Manhattan Project and help preserve the park for future generations.

This certifies that _____ , age _____ , has successfully completed the requirement of a Junior Ranger on this _____day of _____ , 20 _____.

Reviewed by Park Staff Member _____.

Name of Park Staff Member

If you can't return to the Visitor Contact Station, mail your handbook to:

Manhattan Project National Historical Park – Hanford Unit
2000 Logston Boulevard
Richland, Washington 99354

Tell us where to mail your badge (if necessary):

Name _____
Address _____
City _____
State _____ Zip _____

Park Stamps and Memories:

This certificate is proudly presented to

_____

please print name

for completing the

Manhattan Project National Historical Park

Hanford Unit

Junior Ranger Activity Booklet

Dated this _____ day of _____

_____

Park Ranger Signature